

REMARKS

Reconsideration of the above-referenced application is requested. Claims 1-7 are in the case. Entry of the amendment of claim 4 is requested as it is believed it places the application in better condition for appeal.

Claim Objections

Claim 4 was objected to because "and" should be inserted at line 6 before "ethyl 2-hydroxy-2 sulfinato propionate-sodium salt." The amendment to claim 4 had been made in our response mailed February 26, 2002; however the amended claim was not correctly transcribed into the amendment mailed on June 3, 2002. Applicants' agent apologizes for the confusion and extra work this omission has caused.

Rejections under 35 USC 112, second paragraph

A) The recited "2-hydroxy-2-sulfinato propionic acid-disodium salt per claim 4 was seen as engendering non-art recognized terminology. The suggested terminology, "2-hydroxy-2-sulfinato propionate-disodium salt" has been incorporated into the amended claim.

B) The recited "catalytic system" per claim 5 was seen as constituting indefinite subject matter because it did not have proper antecedent basis. The amendment to claim 5 had been made in our response mailed on February 26, 2002; however the amended claim was not correctly transcribed into the amendment mailed on June 3, 2002. Applicants' agent again apologizes for the confusion and extra work this omission has caused.

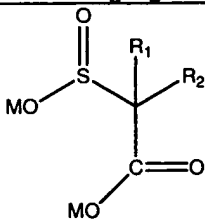
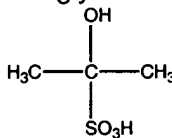
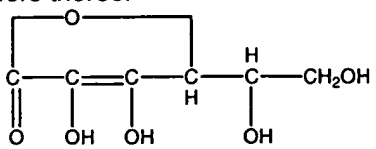
It is believed that the rejections under 35 USC 112, second paragraph have been overcome and the rejections should be withdrawn.

Rejection under 35 USC 103(a)

The rejection of claims 1-7 under 35 USC 103(a) as being unpatentable over Pinschmidt, Jr. et al. or Wiest et al in combination with Applicants' own disclosure. It was maintained, inter alia, that Pinschmidt, Jr. et al and Weist et al differ basically from the claimed invention as per the non-express recognition of the specifically depicted reducing agent; however the interchangeability of one well known reducing agent for another is a matter of ordinary choice to the skilled artisan. It was also maintained that Pinschmidt, Jr. et al. and Wiest et al were closer to the claimed invention than Mudge et al; however no reasons were given to support this assertion. The undersigned strongly disagrees with the Examiner's

assertion regarding the closest prior art. A careful review of Pinschmidt, Jr. et al, Wiest et al, and Mudge et al shows that Mudge et al is the closest reference.

Below is a table that provides a comparison of the claimed invention to Pinschmidt, Jr. et al, Wiest et al, and Mudge et al.

Claims/Reference	Monomers forming Polymer Emulsion	Reducing Agent
Claims	Vinyl acetate, N-methylol acrylamide (NMA), and optionally other monomers	 <p>where M is a hydrogen atom, an ammonium atom or a monovalent metal ion, R<sub>1</sub> is OH or NR<sub>4</sub>R<sub>5</sub> wherein R<sub>4</sub> and R<sub>5</sub> each are H or C<sub>1</sub>-C<sub>6</sub> alkyl; R<sub>2</sub> is H or an alkyl, alkenyl, cycloalkyl or aryl and the like.</p>
Pinschmidt, Jr. et al	Vinyl monomer; one monomer system is vinyl acetate, ethylene and <u>optionally</u> a functional monomer such as an ether of NMA. NMA itself is not listed as a possible monomer and is not in any of the examples.	ketone bisulfite; the ketone having 3-8 carbon atoms, such as acetone bisulfite and glyoxal bisulfite.  <p>acetone bisulfite</p>
Wiest et al	Ethylene; vinyl acetate; a monomer having an N-methylol group, such as NMA; an acryl compound; a mono-olefinically-unsaturated carboxylic acid; and a poly-olefinically-unsaturated monomer having a Tg of -40 to +10 °C	Examples of <u>optional</u> reducing agents (col.5, lines 13-18): sodium formaldehyde sulfoxylate; iron-II salts; sodium dithionite; sodium hydrogen sulfite; sodium sulfite; and sodium thiosulfate.  No reducing agent was used in examples 1-5; sodium formaldehyde-sulfoxylate was used in examples 6-9.
Mudge et al	Vinyl acetate, NMA, and optionally other monomers	ascorbic acid (structure below) and isomers thereof 

Pinschmidt, Jr. et al teach a process for polymerizing a reaction mixture of vinyl monomer, stabilizer, oxidizing agent and reducing agent, wherein the reducing agent is a water-soluble ketone bisulfite. The reported value of the reducing agent is the fact that the

reducing agent is free of formaldehyde yet permits control of the polymerization without yellowing or odor problems (col.2, lines 28-32). Representative vinyl monomers are listed at col. 2, lines 47-65 and vinyl acetate and ethylene are preferred. Examples of functional monomers that are optionally polymerized with vinyl acetate and ethylene are listed at lines 60-65 (col. 2) and include, for example, acrylic acid, glycidyl acrylate, crotonic acid, itaconic acid, maleic acid, and ethers of NMA such as N-n-butoxymethylacrylamide. NMA itself is not listed as an optional monomer nor is it or its ether used in the examples. It would not therefore have been obvious to combine the teachings of Pinschmidt, Jr. et al and Applicants' disclosure to obtain the claimed invention in which vinyl acetate is emulsion polymerized with NMA and optionally another monomer using a reducing agent as recited in claim 1.

Wiest et al teach a thermally self-crosslinkable ethylene/vinyl acetate copolymer consisting essentially of:

- 5 to 50 % by weight ethylene;
- 30 to 87 % by weight vinyl acetate;
- 2 to 10 % by weight of a copolymerizable compound containing an N-methylol group;
- 5 to 20 % by weight of an acryl compound;
- 0.5 to 3 % by weight of a mono-olefinically-unsaturated carboxylic acid; and
- up to 1 % by weight of a poly-olefinically-unsaturated monomer having a Tg of between -40 °C and +10 °C.

Wiest teaches, at col. 5, lines 5 to 18, that suitable polymerization catalysts are the water-soluble free-radical-formers generally used in emulsion polymerization which can be used alone or together with a reducing agent such as sodium formaldehyde-sulfoxylate, iron II salts, sodium dithionite, and others. The reducing agent is not required and in fact is not used in examples 1-5. Sodium formaldehyde-sulfoxylate is used in examples 6-9. Wiest et al does not teach or suggest the advantage of reduced formaldehyde in the polymer product resulting from use of the reducing agents disclosed therein. Since Wiest et al do not require a reducing agent, it would not have been obvious to use a reducing agent as required in the instantly claimed invention.

Mudge et al. teach use of a particular initiator system comprising a hydrophobic hydroperoxide and ascorbic acid (including isomers of ascorbic acid) in order to reduce the formaldehyde content in the preparation of an NMA crosslinked vinyl acetate-based emulsion polymer. Vinyl acetate can be copolymerized with at least one of any conventionally employed comonomer, such as ethylene, vinyl chloride, vinyl esters of aliphatic carboxylic acids, etc.

The claimed invention is directed to a reducing agent for the polymerization of vinyl acetate and NMA and optionally other monomers. One of the advantages of the claimed invention is ability to achieve lower levels of formaldehyde using a reducing agent as recited in claim 1.

In summary, based on the comparison discussed above and summarized in the table, it is submitted that Mudge et al. is the closest reference to the claimed invention. Mudge et al require the presence of a reducing agent (ascorbic acid or isomers of ascorbic acid such as isoascorbic acid) as part of a redox system in the emulsion polymerization reaction of vinyl acetate, NMA, and optionally another monomer. The use of the redox system is reported to result in polymer emulsions with lower levels of free formaldehyde compared to the same polymer emulsions prepared using other redox systems.

Pinschmidt, Jr. et al teach use of a ketone bisulfite as a reducing agent in the production of vinyl polymers. A functional monomer is not required in the polymers disclosed therein; specifically, NMA is not required nor is it listed as an optional functional monomer. Wiest et al do not require a reducing agent for the production of the self-crosslinkable ethylene/vinyl acetate copolymers disclosed therein.

Based on the above remarks, it is submitted that the claimed invention would not have been obvious based on the disclosure of Pinschmidt, Jr. et al or Wiest et al. in combination with Applicants' own disclosure and the rejection of claims 1-7 under 35 USC 103(a) should be withdrawn.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attachment is captioned "**VERSION WITH MARKINGS TO SHOW CHANGES MADE.**"

Respectfully submitted,



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**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

Claim 4 has been amended as follows:

4. (Thrice Amended) The vinyl acetate based polymer of Claim 3 wherein the reducing agent represented by the formula is selected from the group consisting of: 2-hydroxyphenyl hydroxymethyl sulfinic acid-sodium salt; 4-methoxyphenyl hydroxymethyl sulfinic acid-sodium salt; 2-hydroxy-2-sulfinato acetic acid-disodium salt; 2-hydroxy-2-sulfinato acetic acid-zinc salt; 2-hydroxy-2-sulfinato propionate-disodium salt; and ethyl 2-hydroxy-2-sulfinato propionate-sodium salt.